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ABSTRACT

Defining coorientational accuracy as how closely one person estimates another's orientation to something cooriented, this paper examines the reasons why the concept has been favored as a criterion for communicating and how it has been measured. It notes problems in measuring accuracy with reference to various ways the orientation situation has been conceptualized, and proposes a new accuracy measurement technique that can be used to obtain a more comprehensive picture of orientation. The paper also examines the issue of accuracy measurement and discusses several types of measures for scoring accuracy, emphasizing their differences. The paper concludes with a suggestion that the concept of inaccuracy, which is not necessarily dependent on accuracy, also be studied. (FL)

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Theory & Methodology Division

MEASURES OF COORIENTATIONAL ACCURACY

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ABSTRACT

This paper examines why the concept of coorientational accuracy has been favored as a criterion for communicating and how it has been measured. Problems in measuring accuracy are noted with reference to various ways the orientation situation has been conceptualized. A new accuracy measurement technique is introduced to obtain a more comprehensive picture of orientation.

This paper also examines another issue of accuracy measurement: how we score accuracy measures, no matter how orientation is conceptualized. Several types of scoring accuracy measures are discussed and data are examined to exemplify differences among the measures.

Finally, the concept of inaccuracy is suggested for study, as it is not necessarily dependent on accuracy. The particular suggestion is that inaccuracy independently needs to be studied in relation with any or all of communicating, information-processing, and information-constructing.

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MEASURES OF COORIENTATIONAL ACCURACY

Coorientational accuracy is how closely one person estimates another person's orientation to something cooriented. It is one of four coorientational concepts (agreement, congruency, understanding, and accuracy) sorted out in the measurement model of McLeod & Chaffee (1973).

Of the coorientational concepts, accuracy has received special attention, for it is considered quite a reasonable criterion for interpersonal communicating. When we coorient to a certain topic, communicating typically is exchanging each other's orientations to the topic. By doing this, we may figure out each other's orientations more "accurately."

Many researchers have tried to measure coorientational accuracy. However, they have found problems in measuring accuracy along with the other coorientational concepts. The purposes of this paper are: 1) to show how accuracy has been measured; 2) to suggest some new ways to measure accuracy and some new concepts for further study.

Assumptions for Coorientational Concepts

To focus on the concept of accuracy, first we need to review the basic assumptions behind coorientational concepts. All deal with outcomes of interpersonal communicating. Agreement and congruency focus on outcomes of communicating assumed to be functioning as persuasion. Persuasion produces higher agreement between the persons or higher congruency within a person. Agreement, an interpersonal construct, is the similarity between two persons' summary evaluations of a situational object. Congruency, an intrapersonal construct, is the similarity between a person's object evaluation and his estimate of another's evaluation of that object.

Understanding and accuracy are based on a different assumption--that interpersonal communicating functions for information exchange rather than for

persuasion. A communicating act carries information (orientation). Interpersonal communicating is exchanging information. However, such information exchange does not necessarily involve persuasion--changing a person's summary evaluation of something by another's communicating. Thus the more fundamental function of communicating is information exchange rather than persuasion.

Understanding is the content similarity between two persons' orientations; an example is the similarity between two persons' object-by-attribute notions (pertinence relations) defined in Carter's two-object orientation paradigm (1965). Accuracy can deal with either evaluative or non-evaluative orientations. It is the similarity between a person's estimate of another's orientation (or object value) and the other's actual orientation (or object value).

Understanding can be facilitated by information exchange through communicating. But it is not an ideal criterion for interpersonal communicating. Even before communicating, a certain degree of similarity between orientations might be produced by common experience and/or the same environment. This prior similarity may bias any understanding estimate. Accuracy seems to be a better criterion for interpersonal communicating. The reason is that a major goal of interpersonal communicating is to reduce uncertainty regarding the other person's orientation, whether or not persuasion is involved (Wackman, 1973).

In short, accuracy, as outcome of communicating, comes from the more plausible assumption that communicating functions as information exchange. It can also handle either evaluative or non-evaluative orientations, while the other constructs cannot. This is why the concept of accuracy has been favored over other coorientation concepts in relation with communicating.

Accuracy Measurement Types

Accuracy of a person's estimate of another's orientation is adjudged by

comparing that estimate with the other's actual orientation. The key question is: Comparison of what? Thus, the different ways to conceptualize "what" in orientation determine the different ways to measure accuracy.

Accuracy has been variously measured, according to three different conceptualizations of orientation: summary-value-focused, content-focused, and form-focused. Also, accuracy has been measured from two perspectives: the static perspective and the dynamic perspective. The former disregards communicator point of view. The latter considers it. Table 1 summarizes those types:

Table 1: Typology of Accuracy Measurements

	Orientation		
	Value	Content	Form
Static perspective	1	2	3
Dynamic perspective	4	5	6

Accuracy has most frequently been measured for summary-value-focused orientation in the static perspective (cell 1). Interpersonal perception studies in social psychology use this type of measurement. They measure accuracy for summary evaluations of each other's "person characteristics" (e.g., Laing, Phillipson & Lee, 1966; Obitz & Oziel, 1972; Powell & O'Neal, 1976). Other measurements do not deal with each other's specific characteristics, but with third objects or attributes to which both persons concerned coorient (e.g., Brewer & Brewer, 1968; Chaffee & McLeod, 1968; Stamm, Bowes & Bowes, 1973; Pavitt & Cappella, 1979; Meiller & Broom, 1979; Steeves, 1981). In both cases, they measure accuracy by summary evaluations for each orientational object or attribute, using an attitude measurement approach.

This measure of accuracy for summary-value-focused orientation was found to be confounded with agreement and congruency in the coorientation model. So, researchers tried to develop some methodological devices to eliminate the confounding factors (e.g., Cronbach, 1955, 1958; Gage & Cronbach, 1955; Crow & Hammond, 1957; Wackman, 1969). Such confounding problems seem to come from the summary-value-focused conceptualization of orientation. That is, there is not enough information in such data to serve agreement, congruency, and accuracy separately.

In fact, the convenience of available attitude measurement techniques may have led investigators to use the summary-value-focused conceptualization of orientation. Even some social scientists tend to conceive attitude (summary value) as existing at the phenomenal level, although they have not specified how attitude is formed or operates. Originally the attitude concept was invented to indicate either the consistency of <u>responses themselves</u> to a set of stimuli of a given element, or the predisposition <u>directing responses</u> from stimuli (Green, 1954; Carter, 1965; Schramm, 1973).

The response consistency notion of attitude necessarily involved statistics, because it derived from a notion of response probability rather than from its own conceptual explication. From some responses sampled, a disposition or consistency index of responses themselves was obtained. In so doing, social scientists accepted the statistical assumptions of normal distribution and independence of individual events. They did not consider that these assumptions are posited for developing statistical logic rather than for representing characteristics of phenomena. For example, they seem not to have questioned whether our <u>cognitive</u> events (responses) can be really independent of one

another at the phenomenal level. Thus, an attitude measure has been conceived as a direct, real indicator (not merely inference) of a phenomenon.

The bipolar interval scaling used commonly in attitude measurement techniques also reflects the influence of statistics on the attitude concept, because it is based on physical measurement assumptions. The bipolar interval scaling was designed mainly to meet a fundamental physical measurement assumption of additivity of scales supposed to measure independent events. This simply reminds us of the earlier influence of psychophysics. So, bipolar interval scales may be just products of "a bias toward physicalism," to use Kaplan's term (1964, p. 324). Social scientists may have taken a specific technique of bipolar interval scaling in physics as <u>the</u> method to obtain scientific knowledge in psychology.

The predisposition notion of attitude involved predicting action. Attitude was conceived as directing action: If someone has this or that attitude he would do this or that thing. Because attitude is summary value, unlikely to change across situations, it appears useful also for predicting actions across time and space. But this is not the case, as early communication effects studies demonstrated. Though social scientists add <u>all other things being equal</u> to the predictability of attitude, they seem simply to demonstrate their self-fulfilling prophecy.

In a word, we need to question whether the concept of attitude is useful, beyond being convenient and easy to measure.

In cell 2, the accuracy measured is that of content-focused orientation in the static perspective. The minimum elements of a content-focused orientation situation are specified in Carter's two-object orientation paradigm (1965). Grunig (1972) measures accuracy by comparing predictions (by governmental and

nongovernmental change agents) of the poor's and the suburbanites' views about low-cost housing with the latter groups' actual attributions. This approach handled element references per se as well as evaluations implied therein. This type of accuracy seems more comprehensive and reasonable than the cell 1 type, for it considers all discriminations among elements, not merely the summary value for a single element. However, orientation content need not be just elements being discriminated.

The cell 3 type deals with form-focused orientation in the static perspective. Observed is the form similarity of orientations, using Carter's signalled stopping technique (1971; Carter, Ruggels, Jackson & Heffner, 1973; Heffner, 1973). The orientation is defined in terms of stopping patterns. Stopping behavior shows the form of acts free of their content. However, it seems unlikely that all content should be taken away from orientation measures.

The cell 4 type deals with value-focused orientation, but in the dynamic perspective. It utilizes Carter's dynamic model of cognitive discrepancies and communicating (Carter, 1966; Chaffee, Stamm, Guerrero & Tipton, 1969). In Stamm & Pearce's studies (1971; Pearce & Stamm, 1973), they define accuracy as an actor's cognitive homeostasis--his confirmation of his "expected" agreement or disagreement. They then research subsequent communicating behavior. However, their definition of accuracy differs somewhat from coorientational accuracy. They compare the summary evaluations of the orientation expected by and confirmed for an actor, not from two different persons.

The cell 5 type deals with content-focused orientation in the dynamic perspective. This too relates to Carter's dynamic model of cognitive discrepancies and communicating (1966) and his two-object orientation paradigm (1965). Using both, Edwards (1980) measures accuracy as content similarity (re

eight orientational properties in pertinence relations) between a person's actual orientation and another's estimate of it over time. She predicts accuracy in relation to the number of communicating content items each received from the other, first without regard to, and then with regard to, communicators' cognitive homeostasis. This type demands careful management of the experimental sequences: operation of cognitive homeostasis, communicating, and then accuracy estimating. Also, orientation content need not be just elements being discriminated, as mentioned for the cell 2 type.

Interestingly, cell 6 in Table 1 is empty. No study of this type has been reported. Intuitively it seems possible to study a dynamic relationship between cognitive discrepancies and/or communicating and accuracy via form-focused orienation. For example, we may be interested in knowing whether a communicator in a cognitive discrepancy condition seeks more information from his partner and/or whether he has more stops to messages received from his partner.

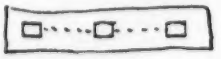
As reported, orientation has so far been conceptualized in terms of summary evaluations, Carter's two-object orientation paradigm, or simply content-free form. Each type has still missed some aspects of orientation, one way or another. So we will introduce here a new technique for measuring orientation more comprehensively.

A New Measurement Type

Kim (1982) studied coorientational accuracy for communicating acts in a group problem-solving context. Orientation is to a problematic situation. It is conceptualized as a systemic structure composed in sequence of antecedent, problem, and consequent sectors. Each included sector is a subsystem in the orientation system. An orientation situation is represented by filling in each sector, using Carter's ideational mechanics (1980a).

The ideational mechanics (also called PIX) derives from Carter's discontinuity theory (1975; 1979; 1980a). It posits that human beings are not totally informed of nature because of its omnipresent discontinuity. So, before they take a step, they give instruction by cognitive construction. They may relate cognitive elements by inside-outside and/or before-after relations.

The ideational mechanics distinguishes three kinds of elements, by using different notational representations: , a tangible thing; , a possible thing; , a quality or characteristic. The distinction enables us to detect how differently we may perceive an element. In the mechanics, the most important part is to distinguish the inside-outside relation from the before-after relation. The former is that an element is located inside or outside of another one (e.g.,). The latter is that an element may be located before or after another one (e.g.,). This distinction of relations enables us to detect different implications of notions.

Relations may also form a compound. The compound notion of system, itself a possible thing, uses both inside-outside and before-after relations. Kim represents the orientation situation as a compound notion (). Each subsystem is filled in with elements and their relations. Thus ideational mechanics provides a more comprehensive picture of orientation within the systemic structure. It does not lose any part of summary value, content, or form--unlike other techniques. Its measurement of accuracy, which is obtained separately for elements and for relations, becomes more precise and is more valid.

Accuracy Indexing Types

No matter how orientation is conceptualized, another issue remains: how we score accuracy measures. This issue pertains to non-summary-value-focused

conceptualizations of orientation (For summary-value data an accuracy measure is obtained simply as the difference score between one's estimate of the other's value and the other's actual value).

For non-summary-value data, accuracy points are the total number of units in a person's estimate of another's orientation that correspond with units in the latter's actual orientation (as depicted in the following notations):

Person A's Estimate	Accuracy Points	Person B's Actual
(X + Z)	(Z)	(Y + Z)

where Z is the number of units in Person A's estimate that correspond with units in Person B's actual orientation;

X + Z is the total number of units in Person A's estimate; and

Y + Z is the total number of units in Person B's actual orientation.

An accuracy measure, as a direct function of communicating, can be either an absolute or a relative index. For the absolute index, accuracy points are used directly as an accuracy measure. For the relative index, accuracy points constitute the numerator for a ratio accuracy measure. There can be various denominators. Also, the distinction between the concepts of accuracy and inaccuracy needs to be considered. These distinctions are shown in Table 2, using the above notations.

The first row (of Table 2) shows absolute accuracy and inaccuracy indices. Accuracy index (Z) is the number of units (accuracy points) corresponding with person B's actual orientation units among person A's estimate units. This is considered the consequence of the direct function of person B's communicating. Inaccuracy index (X) is the number of units (inaccuracy points) not corresponding with person B's actual orientation units among person A's estimate units. So, accuracy and inaccuracy indices are independent of each other.

Table 2. Accuracy and Inaccuracy Indexing Typology

		Accuracy	Inaccuracy
Absolute indices		Z	X
Relative indices	A's estimate as denominator	$\frac{Z}{X + Z}$	$\frac{X}{X + Z}$
	B's actual as denominator	$\frac{Z}{Y + Z}$	$\frac{X}{Y + Z}$
	A's estimate + B's actual as denominator	$\frac{Z}{(X + Z) + (Y + Z)}$	$\frac{X}{(X + Z) + (Y + Z)}$

The second row shows relative accuracy and inaccuracy indices, with the total number of person A's estimate units as the denominator. Accuracy index (Z / (X + Z)) is a ratio of accuracy points to the total number of person A's estimate units. Inaccuracy index (X / (X + Z)) is a ratio of inaccuracy points to the total number of person A's estimate units. Either ratio ranges from 0 to 1. And the addition of the two ratios becomes unity. So accuracy and inaccuracy indices are represented as proportions, a special case of ratio. They are dependent on each other. The concept of inaccuracy here is just the opposite of accuracy.

By taking into account the number of person A's estimate units (X + Z), we may reduce from accuracy points (Z) some possible obtrusive effect that is not a function of person B's communicating and also make accuracy measures more comparable across subjects. For example, A1 may score a higher Z than A2, not necessarily because of more communicating from B1 than from B2, but because A1 produces a greater number of units in his estimate than does A2. This type of

accuracy indexing reduces such obtrusive effect of the estimate units on the accuracy points. Unfortunately, as any B's communicating also affects the number of any A's estimate units, using that number of estimate units as the denominator in the accuracy measure will eliminate some of the direct effect of the B's communicating and thus work against any comparability of accuracy measures across As involving Bs' differential communicating.

Also this index does not take into account some possible obtrusive effect of the number of B's actual orientation units (Y + Z) on the accuracy points (Z). B1 with a higher number of units in his actual orientation than B2 may communicate more units per message (within its structural limits), which in turn may give A1 a higher Z than A2.

In short, this type of accuracy indexing should be used only with these assumptions: that accuracy and inaccuracy are completely dependent on each other; that the possible effect of A's estimate size on Z is not an intervening part of the communicating effect; and that the possible effect of B's actual orientation size on Z is harmless.

In the third row, accuracy and inaccuracy indices are obtained relative to the number of units in B's actual orientation (Y + Z). Here, however, the two measures do not necessarily add up to unity and hence are independent of each other.

This type of accuracy indexing corrects only for the possible obtrusive effect of B's actual orientation size on Z (see third paragraph preceding). It should be used only with these assumptions: that accuracy and inaccuracy are independent of each other; that the possible effect of B's actual orientation size on Z is unexpectedly great; and that the possible effect of A's estimate size on Z is harmless. This index would seem especially useful when

many Bs would lack enough units in their actual orientations to fill the available communicating messages. Then, instead of being dependent mainly on communicating as the predictor variable, Z would be influenced by actual orientation size (i.e., the actual orientation size would be confounded with communicating).

In the fourth row, A's accuracy points (Z) and inaccuracy points (X) are divided by the sum of units in A's estimate and in B's actual orientation to obtain accuracy and inaccuracy indices. These indices do not necessarily add up to unity. They are independent of each other like the third row type.

This type of accuracy indexing corrects for possible obtrusive effects on Z of both A's estimate size and B's actual orientation size. Thus this type may be used more securely, because it reduces all possible obtrusive effects that may be unexpectedly great.

As noted earlier, four empirical studies deal with content or form (non-summary-value) conceptualizations of orientation. However, Grunig's (1972) and Edwards' (1980) studies use accuracy indices that differ from those in Table 2.

Grunig uses the same set of elements (a ready-made list provided by the experimenter) both for obtaining A's estimate of B's orientation and for obtaining B's actual orientation. Also, Grunig's A and B are collectivities rather than persons, although the selections of units for each group are made by the individuals in the group. Thus group A's estimate and group B's actual orientation are represented by distributions of persons over elements, which yields a rank order of elements for each group. The correspondence between the two rank orders determines the group's accuracy measure. Except for the use of a collective instead of an individual point of view, this resembles accuracy indexing from summary value data, where the accuracy index is the difference score between A's estimate of B's attitude score and B's actual attitude score.

such procedure forces accuracy and inaccuracy to be dependent on each other.

Edwards uses the individual's estimate of another individual's orientation. Her accuracy measure is relative, dependent on inaccuracy, but not on the same basis as the indices in the second row of Table 2. Like Grunig, she uses an identical set of elements to obtain both A's estimate and B's actual orientation. She uses a coefficient, Kappa (Cohen, 1960), to take into account two correspondences--between elements selected and between elements not selected by the two persons. The formula corrects for the chance correspondences that would derive from the set of a large number of elements used. The index ranges from 0 to 1.

As seen, Grunig and Edwards use an identical set of elements provided by the experimenter to obtain both A's estimate and B's actual orientation. And the measure of accuracy has a dependent relationship with that of inaccuracy. However, the other two studies--by Heffner (1973) and Kim (1982)--measure accuracy differently.

Heffner treats A's estimate and B's actual orientation independently. She demonstrates two types of accuracy indexing: the absolute accuracy index (the first row of Table 2), and a relative accuracy index (the fourth row of Table 2). In the latter case, she uses the mean of A's estimate units and B's actual orientation units (i.e., $((X + Z) + (Y + Z))/2$) as the denominator. However, this does not differ from using simply the aggregation of estimate units and actual orientation units (i.e., $((X + Z) + (Y + Z))$) as the denominator exactly like the fourth row type. For any individual accuracy measure is divided by the same number (2) and then comparability of accuracy measures across individuals is not affected.

In testing her hypothesis (comparing effects of two differential

communicating treatments), the absolute type produces more significance than the relative one. Though Heffner does not discuss the matter, the relative type's weaker significance may result from reducing some possible obtrusive effects of A's estimates and B's actual orientations beyond the function of B's differential communicating (between two treatments), as discussed earlier.

Kim uses only the absolute accuracy indexing type in his study. This does not control for some possible obtrusive effects. However, the sizes of neither A's estimates nor B's actual orientations were distributed unexpectedly skewedly across conditions. Otherwise, obtrusive effects may have been included in the absolute accuracy measures.

The accuracy indices in the second row (i.e., relative to A's estimate size) and the third row (i.e., relative to B's actual orientation size) of Table 2 can be defective, if used without considering the assumptions involved. Each takes into account only one of the two possible sources of obtrusive effects. However, the second row type is weaker than the third row type, for its accuracy and inaccuracy measures are dependent and A's estimate being used as the denominator is likely to be also the function of B's communicating.

To compare the accuracy indexing type relative to A's estimate size (the second row) and that relative to B's actual orientation size (the third row) with the absolute type (the first row), we re-analyzed a small part of Kim's data (in Table 3). There one hypothesis is that accuracy will be greater with more communicating acts than with fewer communicating acts. We test for differences between the mean accuracy measures from more acts and fewer acts. The analysis shows in probability a striking difference between the first row type or the third row type and the second row type, but not much between the first row and the third row types. The second row type seems to reduce from accuracy measures some direct effect of communicating. The smallness of the difference

Table 3. Example Comparison of Accuracy Indexing Types**

	Accuracy measures for elements					
	Example 1			Example 2		
Types in Table 2*:	1st Row	2nd Row	3rd Row	1st Row	2nd Row	3rd Row
More cmu acts Means (N = 48):	7.40	2.09	1.40	6.52	1.22	0.97
Fewer cmu acts Means (N = 48):	5.25	2.10	1.07	3.90	1.13	0.58
t-value (df=94)	5.71	-0.08	3.37	4.50	0.37	4.19
Probability (one-tailed)	<.001	<.50	<.01	<.001	<.40	<.001

*In Table 2, 1st row uses the absolute accuracy index (accuracy points);
2nd row uses the accuracy index relative to size of A's estimate;
3rd row uses the accuracy index relative to size of B's actual orientation.

**The author did a controlled experiment with three-person problem-solving groups. These examples come from hypothesis-testing across all three sectors--antecedent, problem, and consequent--of an orientation system and across two problematic situations--inflation and academic performance. For the experimental procedure, refer to Kim's dissertation (1982).

* * * * *

between the first and the third row types can be attributed to the slight range in the sizes of Bs' actual orientations. Thus, applying a nearly constant denominator had little effect on the accuracy measures in the third row type. Most of all, such differences must come from the function of each type's unique assumptions discussed earlier.

Conclusions and Suggestions

As discussed, we need to be more concerned with non-summary-value-focused conceptualizations of orientation. Especially, we suggest a conceptualization of

orientation, utilizing Carter's ideational mechanics, to obtain a more comprehensive picture of orientation.

We showed four possible types of accuracy indexing, where one's estimate and the other's actual orientation are not both measured from a single set of content elements provided by the experimenter. We suggest that each type be used only when its unique set of assumptions are met. Otherwise, the fourth row type (of Table 2) may be more secure, for it reduces some possible obtrusive effects of both estimate size and actual orientation size.

In addition, we need to consider the relationship between accuracy and inaccuracy. Especially, we need to consider a new concept of inaccuracy seriously, because it is not necessarily dependent on accuracy. It may have independent relationships with communicating. Intuitively, the concept of inaccuracy seems to be outside orientation. But it may be a consequence of ideational construction and communicating. Human beings not only orient to the environment, but also make sense of it. They process information of the outside, but construct their own sense-making information about it (Carter, 1978; Dervin, Nilan & Jacobson, 1981). Finally, we suggest that inaccuracy should be studied in relation with any or all of communicating, information-processing, and information-constructing.

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